The study of Credit ratings- Its scope and effects in the Infrastructure construction industry in India

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1. INTRODUCTION

1.1 What Is a Credit Rating?

The term credit rating refers to a quantified assessment of a borrower's creditworthiness in general terms or with respect to a particular debt or financial obligation. A credit rating can beassigned to any entity that seeks to borrow money—an individual, a corporation, a state or provincial authority, or a sovereign government. A credit rating is an evaluation of the credit risk of a prospective debtor (an individual, a business, company or a government), predicting their ability to pay back the debt, and an implicit forecast of the likelihood of the debtor defaulting.

2. Objectives of research

1. To study the credit ratings of Infrastructure construction companies in India and derive their relationship between their determinants such as Liquidity, Leverage, Profitability, size of the firm, Growth of the firm, Interest coverage ratio, debt to net worth ratio of the company by studying their financial statements.
2. To analyze how the determinants of credit rating influence the credit rating agencies to rate the construction companies.
3. To find the financial ratios of 100 Infrastructure Construction companies and apply the correlation and Multinomial Logistic Regression model to analyse the relationship between the credit ratings and their financial determinants

3. Need and scope of study

Credit rating agencies help in bridging the information gap between investors and issuers. The rating agencies provide an opinion on the creditworthiness of the debt instruments. They use qualitative and quantitative information to assign ratings-some of which is not easily available inthe public domain. A number of research studies has been used and attempted to study credit ratings with the help of publicly available information. The ratings given by ICRA, CARE, CRISIL, INDIA ratings have been normalized to a certain rank grade to study the model as a dependent variable and the financial parameters as independent variables.

4. Research methodology

Credit rating agencies help in bridging the information gap between investors and the issuers. The rating agencies provide an opinion on the credit worthiness of the debt instruments. They use qualitative and quantitative information to assign ratings some of which is not easily available in public domain. Apart from this there is an element of subjective judgment of the team of experts who arrive at a rating. This makes it very difficult to understand the ratings and the measures used by rating agencies.

4.1 Statistical Tools used
The data collected in this research will be processed and analyzed using statistical tools as

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follows: **4.1.1 Descriptive Statistics**

Descriptive analysis is used to describe or describe data related to the research that has been collected seen from the average value, standard deviation, maximum, and minimum. Thus, this Analysis is useful to give an idea of credit ratings, profitability, leverage, liquidity, company growth, firm size seen from the average value, standard deviation, maximum, and minimum.

4.1.2 Inferential Statistics

 To perform the inferential statistics, SPSS software was used to do the data analysis using the Pearson's correlation model and Multinomial Logistic regression model. Regression is used for understanding the strong relationship between two variables; researchers do not look beyond the primary and commonly use regression analysis method, which is also a type of predictive analysis used. In this method, there is an essential factor called the dependent variable.

4.1.3 Correlation Analysis:

To test the hypothesis of how the credit ratings are correlated individually to its financial determinants, a correlation analysis was performed by using SPSS software. In this analysis the credit ratings and the individual financial determinants are correlated and the Pearson's Correlation coefficient was found to test the hypothesis individually.

4.1.4 Multinomial Logistic Regression:

This research uses multinomial logistic regression to examine the effect of profitability ratios, leverage, liquidity, company growth, and firm size on credit ratings. Multinomial Logistic regression analysis is a regression method that describes the relationship between several explanatory variables and an ordinal variable. The response variable in the multinomial logistic regression method is said to be ordinal because it consists of eight categories namely 8,7,6,5,4,3,2 and 1. This technique has been used to investigate the impact of the explanatory variables on the credit ratings. The credit ratings Y, of a company I (Y_i) have been studied as a function of the explanatory variables in the following model:

Credit Ratings (Y_i) = f (Financial characteristics, size and growth of company)

Logistic regression models the probability of one of the eight outcomes using the independent variables. Multinomial logistic regression is an extension of the binary logistic regression. It generalizes logistic regression by allowing more than two outcomes of dependent variables which maybe non-metric: nominal or ordinal. The dependent variable may be metric or non-metric. It describes polytomous responses by a sequence of binary models. If the ordinal dependent variable is divided into k categories, it compares the probability of being in each of the (k-1) categories compared to a reference category k.

4.1.5 Assess the Overall Model (Overall Fit Model)

This test is used to assess models that have been hypothesized to have been fit or not with the data. Testing is done by comparing the value between -2-log likelihood (-2LL) at the beginning (block number = 0) with the value of -2LL at the end (block number = 1). The reduction in the value between the initial -2LL (initial-2LL function) and the value of -2LL in the next step (-2LL end) indicates that the model hypothesized is fit with the

data. **4.1.6 5The coefficient of Determination (R2)**

Testing the coefficient of determination in logistic regression using Negelkerke's R square. The purpose of this test is to find out how much the combination of independent variables, namely profitability, leverage, liquidity, company growth, and firm size can explain the variability of the dependent variable, namely the credit rating.

5. Analysis and Interpretations:

5.1 Descriptive statistics

Descriptive statistics are applications of statistics that attempt to explain or describe the characteristics of data, such as how much the average, how far the data varies, and so on.. This descriptive statistical measurement was carried out using Statistical package for social science (SPSS) program at 22.0 for Microsoft windows. The results of Descriptive statistics are presented in the following table:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
CREDITRATINGS	100	1	8	4.56	2.148
SIZE	100	.00	29646.00	3026.6836	5277.89766
GEARING	100	-48.66	26.10	1.9387	6.85526
COVERAGE	100	-2.34	147.22	6.4328	17.23890
PROFITABILITY	100	-123.31%	60.49%	6.4724%	23.26946%
GROWTH	100	-87.00%	119.00%	4.3400%	35.08006%
LIQUIDITY	100	.08	7.45	1.4645	.96444
LEVERAGE	100	-4.75	34.06	1.8879	4.48840
Valid N (listwise)	100				

Based on the Table 4.1 above, the amount of data stated as valid observation is 100, which is the total sample of the population of Infrastructure Construction Companies in India whose credit ratings and their financial determinants were found out. The following is a description of the data from research variable.

1. Firm Size:

The size of a company is measured by the operating income/Revenue of the company. Firm size proxied by SIZE has a maximum value of Rs.29646cr and a minimum value of Rs.0cr.The company with the maximum revenue is Monte Carlo Limited AND THE company with the minimum revenue is Telangana State Industrial Infrastructure Corp. Ltd. The average of the firm size is 3026.6836 and the standard deviation id 5277.897.

2. Gearing Ratio:

The gearing ratio is the Total debt/Total assets owned by the company. The maximum value of gearing ratio is 26.10 and minimum value is -48.66. The company with maximum gearing ratio is Tata Realty and Infrastructure Limited and minimum gearing ratio is Lanco Infratech ltd. The average of gearing ratio is 1.9387 and the standard deviation is 17.238.

3. Interest Coverage ratio:

The Interest coverage ratio is the EBIDTA/Interest on debt of the company. The maximum value of Interest coverage ratio is 147.22 and minimum value is -2.34. The company with maximum ratio is SMS-AABS India Toll ways private limited and minimum ratio is Sadhbav engineering ltd. The average of ratio is 6.4328 and the standard deviation is17.23890.

4. Profitability:

The profitability of the firm is the Profit after tax/Revenue of the company. The maximum value is 60.49% and the minimum value is -123.31%. The company with the maximum profitability is MEP Infrastructure Developers Limited and the minimum profitability is IL&FS pvt ltd. The average of profitability is 6.472% and the standard deviation is 23.269.

5. Growth of the Firm:

The growth of the firm proxied by GROWTH is the percentage change in revenue of the considered firm with respect to the revenue in the previous year. The maximum value is 119% and the minimum value is -87%. The company with the maximum Growth is Maharashtra rail infrastructure Development Corporation limited. The average growth of the companies is 4.34% and the standard deviation is 35.08.

6. Liquidity:

The liquidity also known as Current ratio is the current assets/current liabilities. The maximum value is 7.45 and the minimum value is 0.08. The company that has the maximum liquidity is MAN Infra construction ltd and the minimum liquidity is IL&FS pvt ltd. The average of the liquidity is 1.464 and the standard deviation is 0.964.
7. Leverage:

The leverage of a company is the Debt/Total shareholder's Equity of the firm considered. The maximum value is 34.06 and the minimum value is -4.75. The company that has the maximum leverage is Gayatri projects ltd and the minimum leverage is Consolidated construction consortium pvt ltd. The average of leverage of all companies is 1.887 and the standard deviation is 4.488

5.2 Frequency Distribution of Credit Ratings

**Table 5.2 Frequency distribution of credit ratings assigned in the given**

Frequency Table

CREDITRATINGS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	20	20.0	20.0	20.0
	2	2	2.0	2.0	22.0
	3	3	3.0	3.0	25.0
	4	15	15.0	15.0	40.0
	5	18	18.0	18.0	58.0
	6	24	24.0	24.0	82.0
	7	15	15.0	15.0	97.0
	8	3	3.0	3.0	100.0
	Total	100	100.0	100.0	

sample:

Fig 5.2 Pie chart of Credit ratings of 100 Construction

companies: Credit ratings of 100

Companies

3%

15%

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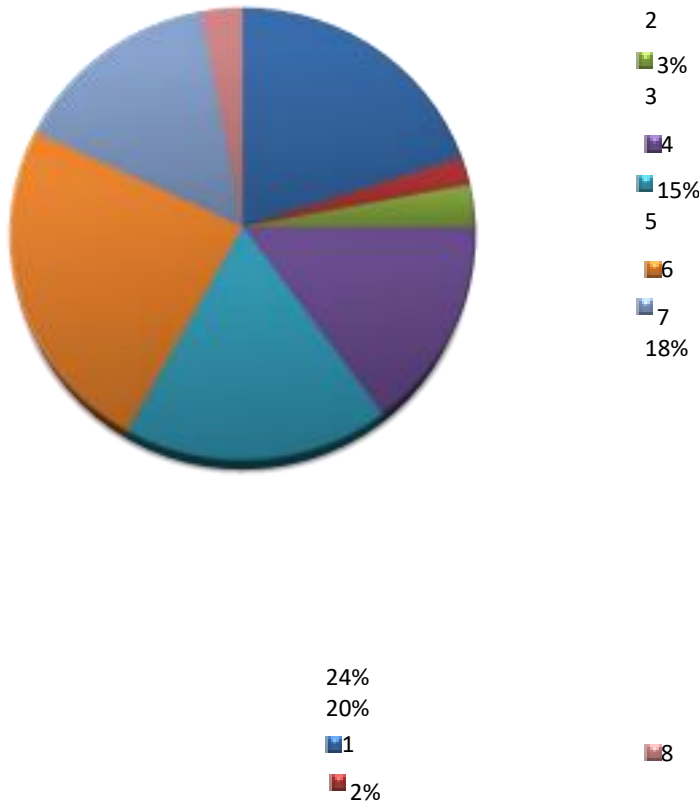
5.3 Correlation Analysis on credit ratings and their financial determinants:

Correlation refers to the statistical relationship between the two entities. It measures the extent to which two variables are linearly related. Pearson's Correlation is the test statistics that measures the statistical relationship, or association, between two variables.

Hypothesis Testing 1:
H0: There is no relationship between Credit ratings and Size/Revenue of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Size/Revenue of the infrastructure construction company.

Table 5.3 Correlation of Credit rating and size of the firm:

Correlations

		CREDITRATINGS	SIZE
CREDITRATINGS	Pearson Correlation	1	.244*
	Sig. (2-tailed)		.014
	N	100	100
SIZE	Pearson Correlation	.244*	1
	Sig. (2-tailed)	.014	
	N	100	100

*. Correlation is significant at the 0.05 level (2-tailed).

Results: The above table depicts the correlation between Credit ratings and Size/Revenue of the

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construction companies. From this it can be evidently seen that the level of significance is 0.014 which is less than 0.05. Therefore, this correlation is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and size of the firm. We reject the null hypothesis.

Hypothesis Testing 2:

H0: There is no relationship between Credit ratings and Gearing ratio of the infrastructure construction company.

H2: There is a relationship between Credit ratings and Gearing ratio of the infrastructure construction company

Table 5.4 <u>Correlation of Credit rating and Gearing ratio of the firm:</u> **Results:** The above table depicts the correlation between Credit ratings and Gearing ratio of the

Correlations

		CREDITRATINGS	GEARING
CREDITRATINGS	Pearson Correlation	1	.120
	Sig. (2-tailed)		.235
	N	100	100
GEARING	Pearson Correlation	.120	1
	Sig. (2-tailed)	.235	
	N	100	100

construction companies. From this it can be evidently seen that the level of significance is 0.235 which is greater than 0.05. Therefore, this correlation is not significant at the level of 0.05, therefore we reject the Alternative hypothesis H2 and there is no significant relationship between credit rating and gearing ratio of the firm. We accept the null hypothesis

Hypothesis Testing 3:

H0: There is no relationship between Credit ratings and Interest coverage of the infrastructure construction company.

H1: There is a relationship between Credit ratings and Interest coverage of the infrastructure construction company.

Table 5.5 <u>Correlation of Credit rating and Interest Coverage of the</u>

Correlations

		CREDITRATINGS	COVERAGE
CREDITRATINGS	Pearson Correlation	1	.216*
	Sig. (2-tailed)		.031
	N	100	100
COVERAGE	Pearson Correlation	.216*	1
	Sig. (2-tailed)	.031	
	N	100	100

*. Correlation is significant at the 0.05 level (2-tailed).

<u>firm:</u>

Results: The above table depicts the correlation between Credit ratings and Interest coverage of the construction companies. From this it can be evidently seen that the level of significance is 0.031 which is less than 0.05. Therefore, this correlation is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and Interest coverage of the firm. We reject the null hypothesis.

Hypothesis Testing 4:

H0: There is no relationship between Credit ratings and Profitability of the infrastructure construction company.

H1: There is a relationship between Credit ratings and Profitability of the infrastructure construction company

Table 5.6 <u>Correlation of Credit rating and Profitability of the firm:</u>

Results: The above table depicts the correlation between Credit ratings and

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Correlations

		CREDITRATIN GS	PROFITABILIT Y
CREDITRATINGS	Pearson Correlation	1	.259**
	Sig. (2-tailed)		.009
	N	100	100
PROFITABILITY	Pearson Correlation	.259**	1
	Sig. (2-tailed)	.009	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

Profitability of the construction companies. From this it can be evidently seen that the level of significance is 0.009 which is less than 0.05. Therefore, this correlation is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and Profitability of the firm. We reject the null hypothesis.

Hypothesis Testing 5:
H0: There is no relationship between Credit ratings and Growth of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Growth of the infrastructure construction company.

Table 5.7 <u>**Correlation of Credit rating and Growth of the firm:**</u>

Results: The above table depicts the correlation between Credit ratings and Growth of the construction companies. From this it can be evidently seen that the level of significance is 0.026 which is less than 0.05. Therefore, this correlation is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and Growth of the firm. We reject the null hypothesis.

Hypothesis Testing 6:
H0: There is no relationship between Credit ratings and Liquidity of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Liquidity of the infrastructure construction company.

Table 5.8 <u>**Correlation of Credit rating and Liquidity of the firm:**</u>

Results: The above table depicts the correlation between Credit ratings and Liquidity of the construction companies. From this it can be evidently seen that the level of significance is 0.017 which is less than 0.05. Therefore, this correlation is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and Liquidity of the firm. We reject the null hypothesis.

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Hypothesis Testing 7:

H0: There is no relationship between Credit ratings and Leverage of the infrastructure construction company.

H1: There is a relationship between Credit ratings and Leverage of the infrastructure construction company.

Table 5.9 <u>Correlation of Credit rating and Leverage of the firm:</u>

Results: The above table depicts the correlation between Credit ratings and Leverage of the construction companies. From this it can be evidently seen that the level of significance is 0.006 which is less than 0.01. Therefore, this correlation is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and Leverage of the firm. We reject the null hypothesis.

5.4 Multinomial Logistic Regression

The main objective of this Research is to find out the determinants of credit ratings and empirically investigate their significance using the Multinomial logistic regression methodology. The regression analysis examines the nature and direction of relationship between the credit ratings (dependent variable) and the independent variables with respect to the research hypothesis. Multinomial logistic regression with credit rating as dependent variable and the seven predictors (Explanatory variables) are examined in this model. This method is an extension of the binary logistic regression and has been presented in the following equation:

The left-hand side gives the log of odds of being in a category as compared to the referent category. In the given equation, j= categories (1, 2, 3, 4, 5, 6, 7, 8) of credit rating, Y and k is the referent category. The exponent of the log of odds (Exp (β)) is taken to intercept in terms of odds ratio (a ratio of an outcome to the other).

Table 5.10 <u>Likelihood Ratio Test and Pseudo R-square results:</u>

Likelihood Ratio Tests						
Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced	Chi Square	df	Sig.

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			Model			
Intercept	364.394	492.048	266.394	20.506	7	0.005
SIZE	374.189	501.843	276.189	30.301	7	0.000
GEARING	356.805	484.459	258.805	12.917	7	0.044
COVERAGE	370.120	497.773	272.120	26.231	7	0.000
PROFITABILITY	353.731	481.384	255.731	9.843	7	0.198
GROWTH	363.697	491.350	265.697	19.809	7	0.006
LIQUIDITY	349.271	476.925	251.271	5.383	7	0.613
LEVERAGE	352.196	479.850	254.196	8.308	7	0.306
Overall Model Fit	357.888	503.778	245.888	120.278	49	0.000
Pseudo R square(Nagelkerke)						0.718

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model.

On the basis of likelihood ratio test, the model with the seven explanatory variables depicts significant relationship between the credit ratings and the selected predictors. The Nagelkerke R^2 is 71.8% which implies that the selected variables explain approximately 72% of the variation in the outcome variable i.e credit ratings. The Four independent variables that have been found to be significant determiners of credit ratings are Size, Gearing ratio, Interest coverage, Growth (% Change of the company). In the above table it is inferred that the significance of the independent variables such as Size, Gearing ratio, Interest coverage, Growth of the company is 0.000,0.044,0.000, 0.006 respectively and they are less than 0.05, which implies that there is a significant relationship between the credit ratings of the infrastructure companies and these variables. The other variables such as Profitability, Liquidity and

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leverage do not have a significant relationship with the credit ratings assigned by the company as their significance levels are greater than 0.05.

5.4.1 Overall Model fit

Table 5.11 Model Fitting Information:

Model Fitting Information						
Model	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC	BIC	-2 Log Likelihood	Chi Square	df	Sig.
Intercept Only	380.166	398.402	366.166			
Final	357.888	503.778	245.888	120.278	49	0.000

The above table shows the test results of the comparison between the initial -2 Log likelihood test and the final -2 Log likelihood tests. Based on this table the initial value of -2LL is 366.166. After the 7 independent variables, the final value of -2LL decreased to 245.888. This decrease in Likelihood (-2LL) shows a better regression model, or in other words, the model hypothesized fits with the data. Therefore, the data for regression fits with the Multinomial logistic Regression model.

5.4.2 Coefficient of determination(R^2):

Table 5.12 Pseudo R-Square Test:

Pseudo R-Square	
Cox and Snell	0.700
Nagelkerke	0.718
McFadden	0.328

Based on the above table, the logistic regression test obtained Nagelkerke R^2 value of 0.718 means that the dependent variable can be explained by the independent variables by 71.8% while the remaining 28.2% is explained by other variables explained by other variables outside the research model. This shows that these 7 variables that were selected have 71.8% effect on the Credit ratings.

5.4.3 Hypothesis testing for Multinomial regression results
Hypothesis Testing 1:
H0: There is no relationship between Credit ratings and Size/Revenue of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Size/Revenue of the infrastructure construction company.

Table 5.12 Regression test between credit ratings and Size of the company:

Likelihood Ratio Tests						
Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi Square	df	Sig.
SIZE	374.189	501.843	276.189	30.301	7	0.000

Results: The above table 4.11 depicts the logistic regression model between the Credit ratings and Size/Revenue of the construction companies. From this it can be evidently seen that the level of significance is 0.000 which is less than 0.05. Therefore, this regression is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and size of the firm. We reject the null hypothesis. The results of statistical testing using logistic regression indicate that firm size has a significant effect on bond ratings. Firm size shows how big and small of a company. In this research, the size of a company is measured by the operating income/Revenue of the company Companies with higher revenue are interpreted as well established companies and are able to manage their financial well. Therefore, they are expected to have the ability to pay off their debts.

Hypothesis Testing 2:
H0: There is no relationship between Credit ratings and Gearing ratio of the infrastructure construction company.
H2: There is a relationship between Credit ratings and Gearing ratio of the infrastructure construction company

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Table 5.13 Regression test between credit ratings and Gearing ratio:

Likelihood Ratio Tests						
Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model BIC of	Reduced Model -2 Log Likelihood of Reduced Model		Chi Square	df	Sig.
GEARING	356.805	484.459	258.805	12.917	7	0.044

Results: The above table 4.11 depicts the logistic regression model between Credit ratings and Gearing ratio of the construction companies. From this it can be evidently seen that the level of significance is 0.044 which is lesser than 0.05. Therefore, this regression is significant at the level of 0.05, therefore we accept the Alternative hypothesis H2 and there is a significant relationship between credit rating and gearing ratio of the firm. We reject the null hypothesis. The gearing ratio is the Total debt/Total assets owned by the company. From this statistical testing it is seen that the total assets owned by the company along with its debt has a significant relationship with the credit ratings. The total assets owned by the company can be used in future if required to repay the company's debt.

Hypothesis Testing 3:

H0: There is no relationship between Credit ratings and Interest coverage of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Interest coverage of the infrastructure construction company.

Table 5.14 Regression test between credit ratings and Interest Coverage ratio:

Likelihood Ratio Tests						
Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi Square	df	Sig.

COVERAGE	370.120	497.773	272.120	26.231	7	0.000

Results: The above table depicts the logistic regression model between Credit ratings and Interest coverage of the construction companies. From this it can be evidently seen that the level of significance is 0.000 which is less than 0.05. Therefore, this regression is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and Interest coverage of the firm. We reject the null hypothesis. The results of statistical testing using logistic regression indicate that the leverage ratio proxied by Interest Coverage has a significant effect on bond ratings. Interest Coverage measures how many times a company can cover its current interest payment with its available earnings. In other words, it measures the safety margin of a company has for paying interest on its debt during a given period. Companies need to have more than enough earnings to cover interest payments in order to survive financial hardships that may arise. A company's ability to meet its interest obligations is an important factor in return to debt holders.

Hypothesis Testing 4:

H0: There is no relationship between Credit ratings and Profitability of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Profitability of the infrastructure construction company.

Table 5.15 Regression test between credit ratings and Profitability:

Likelihood Ratio Tests						
Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi Square	df	Sig.
PROFITABILITY	353.731	481.384	255.731	9.843	7	0.198

Results: The above table depicts the logistic regression model between Credit ratings and Profitability of the construction companies. From this it can be evidently seen that the level of significance is 0.198 which is higher than 0.05. Therefore, this regression is not significant and we reject the Alternative hypothesis H1 that there is no significant relationship between credit rating and Profitability of the firm. We accept the null hypothesis.

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Hypothesis Testing 5:
H0: There is no relationship between Credit ratings and Growth of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Growth of the infrastructure construction company.

Table 5.16 Regression test between credit ratings and Growth of the company:

Likelihood Ratio Tests						
Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi Square	df	Sig.
GROWTH	363.697	491.350	265.697	19.809	7	0.006

Results: The above table depicts the logistic regression model between Credit ratings and Growth of the construction companies. From this it can be evidently seen that the level of significance is 0.006 which is less than 0.05. Therefore, this regression is significant and we accept the Alternative hypothesis H1 that there is a significant relationship between credit rating and Growth of the firm. We reject the null hypothesis. The growth of a company is depicted by the percentage change in revenue of the infrastructure construction company. The revenue of a company is very important to know as to how much income the company earns throughout the year. The companies with higher revenue can repay their debts without any obligations.

Hypothesis Testing 6:
H0: There is no relationship between Credit ratings and Liquidity of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Liquidity of the infrastructure construction company

Table 5.17 Regression test between credit ratings and Liquidity:

Likelihood Ratio Tests

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Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi Square	df	Sig.
LIQUIDITY	349.271	476.925	251.271	5.383	7	0.613

Results: The above table depicts the logistic regression model between Credit ratings and liquidity of the construction companies. From this it can be evidently seen that the level of significance is 0.613 which is much higher than 0.05. Therefore, this regression is not significant and we reject the Alternative hypothesis H1 that there is no significant relationship between credit rating and Liquidity of the firm.
We accept the null hypothesis.

Hypothesis Testing 7:
H0: There is no relationship between Credit ratings and Leverage of the infrastructure construction company.
H1: There is a relationship between Credit ratings and Leverage of the infrastructure construction company.

Table 5.18 Regression test between credit ratings and Leverage:

Likelihood Ratio Tests						
Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi Square	df	Sig.
LEVERAGE	352.196	479.850	254.196	8.308	7	0.306

Results: The above table depicts the logistic regression model between Credit ratings and liquidity of the construction companies. From this it can be evidently seen that the level of significance is 0.306 which is much higher than 0.05. Therefore, this regression is not significant and we reject the Alternative hypothesis H1 that there is no significant relationship between credit rating and Leverage

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of the firm. We accept the null hypothesis.

6. Findings

6.1 Correlation Analysis

The preliminary investigations included correlation statistics, Descriptive statistics and measures of association. The correlated variables are identified by finding the Pearson's correlation coefficient for each of the financial determinants of Credit ratings. It was found that from the correlation analysis there was a significant relationship between the credit ratings and its financial determinants such as Size/revenue, Profitability, Leverage, Liquidity, Growth and Interest coverage ratio. But there was no correlation between credit ratings and gearing ratio of the firms .Therefore, under the correlation analysis we found six hypothesis wherein there was a significant relationship between Credit ratings and its financial determinants while there was no significant relationship between the credit rating and gearing ratio which is given by Debt/Total assets.

6.2 Multinomial Logistic Regression Analysis

The next main objective of the research is to empirically investigate the significant relationship of credit ratings and their financial determinants using Multinomial logistic regression. Under this analysis on the basis of Likelihood ratio test, the model with seven explanatory variables depict the relationship between the credit ratings and the selected predictors. The four independent variables that are said to have a relationship are Size/Revenue of the company, Gearing ratio, Interest coverage ratio and the Growth of the company. The other three independent variables such as Leverage, Liquidity, Profitability do not have a significant relationship with the credit ratings of the firm under this model.

7. Conclusion

This research was done to study the credit ratings of Infrastructure Construction companies in India. Under this Research the credit ratings of 100 Infrastructure Construction companies were studied along with the financial reports of those companies with the financial statements. The relationship between Credit ratings and its financial determinants were found out under the research methodology using Correlation and regression and it was found that Credit ratings has a significant correlation with its financial determinants such as Size of the company, Growth, Interest Coverage Ratio, Profitability, Leverage and Liquidity. But there was an insignificant correlation between Credit ratings and Gearing ratio. Then a Multinomial Logistic Regression model was used to understand the Significance and it was found that Credit ratings has a significant relationship with Size, Growth, Interest Coverage ratio and gearing ratio. But there was an insignificant relationship of Credit ratings with Leverage, Liquidity and Profitability under this Model. Credit rating agencies help in bridging the information gap between investors and issuers. The rating agencies provide an opinion on the creditworthiness of the debt instruments. They use qualitative and quantitative information to assign ratings-some of which is not easily available inthe public domain. A number of research studies has been used and attempted to study credit ratings with the help of publicly available information. In Indian context, most of the studies evaluate the performance of rating agencies in terms of their usefulness to individual and institutional investors. The present research paper aims to empirically analyze the relationship of financial characteristics and credit ratings.

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